

The Global Children's Challenge Program: Pedometer Step Count in an Australian School

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Abstract—The importance and significance of this research is based upon the fundamental knowledge reported in the scientific literature that physical activity is inversely associated with obesity. In addition, it is recognized there is a global epidemic of sedentariness while at the same time it is known that morbidity and mortality are associated with physical inactivity and as a result of overweight or obesity. Hence this small study in school students is an important area of research in our community. An application submitted in 2005 for the inaugural Public Health Education Research Trust [PHERT] Post Graduate Research Scholarship scheme organized by the Public Health Association of Australia [PHAA] was awarded 3rd place within Australia. The author and title was: D. Hilton, Methods to increase physical activity in school aged children [literature review, a trial using pedometers and a policy paper]. Third place is a good result, however this did not secure funding for the project, as only first place received \$5000 funding. Some years later within Australia, a program commenced called the Global Children's Challenge [GCC]. Given details of the 2005 award above were included an application submission prepared for Parkhill Primary School [PPS] which is located in Victoria, Australia was successful. As a result, an excited combined grade 3/4 class at the school [27 students] in 2012 became recipients of these free pedometers. Ambassadors for the program were Mrs Catherine Freeman [OAM], Olympic Gold Medalist – Sydney 2000 [400 meters], while another ambassador was Mr Colin Jackson [CBE] who is a Welsh former sprint and hurdling athlete. In terms of PPS and other schools involved in 2012, website details show that the event started on 19th Sep 2012 and students were to wear the pedometer every day for 50 days [at home and at school] aiming for the recommended 15,000 steps/day recording steps taken in a booklet provided. After the finish, an analysis of the average step count for this school showed that the average steps taken / day was 14, 003 [however only a small percentage of students returned the booklets and units] as unfortunately the dates for the program coincided with school holidays so some students either forgot or misplaced the units / booklets. Unfortunately funding for this program ceased in 2013, however the lasting impact of the trial on student's knowledge and awareness remains and in fact becomes a good grounding for students in how to monitor basic daily physical activity using a method that is easy, fun, low cost and readily accessible.

Keywords—Walking, exercise, physical activity [motor activity].

I. BACKGROUND AND LITERATURE REVIEW

A. AusDiab Study

THE AusDiab study, a population based study from 1999-2000 included 1,848 persons whom completed the AusDiab survey and 1126 persons [609 women and 517 men]

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whom wore pedometers. Hence survey data and pedometer results were collected. The conclusion was that increasing daily steps was associated with a decline in obesity measures [1]. Cameron and colleagues whom also reported on the Ausdiab study included 20,347 eligible people aged > or = 25 years whom completed a household interview and of those 11,247 also attended the physical examination at local survey sites (response rate, 55%) [2]. The results showed that lower educational status, higher television viewing time and lower physical activity time were each strongly associated with obesity.

B. Child Research; Overweight/Obesity and School Programs

Childhood obesity is related to a low physical activity level and a sedentary lifestyle. A Malaysian study of 1,736 children in total whom were given the physical activity questionnaire and 514 whom wore pedometers found that physical activity score and pedometer step counts were negatively associated with body mass index, percentage body fat and waist circumference. Screen time was associated with body mass index for age z score and waist circumference [3]. A review on controlling childhood obesity included 105 relevant papers, 70 of which were conducted as high quality clinical trials [4]. Our findings reported that school-based programs can have long-term effects in a large target group. It is possible that this may-be related to the fact children spend much time at school and adopt some parts of lifestyle there. Another review, a systematic review that included 44 studies and 36,593 children and adolescents that evaluated the impact of school based interventions on physical activity found that children exposed to school-based physical activity interventions were three times more likely to engage in moderate to vigorous physical activity during the school day when compared to those not exposed [5].

The Health Initiative Program for Kids looks at the effects of a 1-year multidisciplinary lifestyle intervention on adiposity and quality of life in obese children and adolescents [6]. 42 obese children and adolescents were included and participants followed a one-year intervention which resulted in improvement in body mass index z-scores and quality of life, while other adiposity-related measures of body composition remained unchanged [6]. Child and adolescent obesity is increasingly prevalent, and can be associated with significant short- and long-term health consequences [7]. A Cochrane systematic review that included 64 randomized controlled trials, included trials of lifestyle (i.e. dietary, physical activity and/or behavioral therapy), and drug interventions for treating obesity in children. The results were that combined behavioral

lifestyle interventions compared to standard care or self-help can produce a significant and clinically meaningful reduction in overweight in children and adolescents. Childhood obesity can cause social, psychological and health problems, and is also related to adult obesity and poor health outcomes in adulthood [8]. A Cochrane systematic review that included 55 studies looked at programs aiming to improve either nutrition or physical activity. The meta-analysis included 37 studies, involving 27,946 children and the conclusion was that programs were effective at reducing adiposity although some individual interventions were not [8].

II. RESULTS

A. Global Children's Challenge Program [PPS]

A combined grade three and four class at Parkhill Primary School [PPS] which is located in Ashwood, Victoria were successful in being selected to receive free pedometers from the global children's challenge program. The recipients of the pedometers in 2012 included 27 students. They were required to wear the unit for 50 days and students were given a booklet whereby they could record steps taken each day.

Unfortunately, the 50 days included the school holidays so hence this interfered with consistency of recording in that some students didn't remember to take the units on school holidays, while others may have packed them but forgot to wear these during the day, while others may have worn these, but at the end of the day they failed to record steps taken. Lastly, many students lost booklets and pedometers on the school holidays either leaving these on the beach, at a resort or in the caravan where they stayed. When school returned in term 4, at the completion of the 50 days, the class teacher requested that students return their units and booklets. Only 6 students returned the fully or partially completed booklets.

Table I shows the raw data for the 6 students whom returned their booklets. 50 days of readings are displayed. Dashes indicate that readings were not recorded on that particular day. This data was recorded by students and not validated or checked by either a parent or a teacher so there maybe errors made with transferring results to paper or readings may have been misreported intentionally. In addition, on a few entries, students have altered the numbers by crossing out a recording and rewriting it as a different entry.

TABLE I
GLOBAL CHILDREN'S CHALLENGE PROGRAM PARKHILL PRIMARY SCHOOL [PPS] DAILY Pedometer STEP COUNT FOR 6 STUDENTS WHOM RETURNED BOOKLETS

Student Date	1	2	3	4	5	6
Sept 19	16833	10010	9411	9000	9222	13310
20	16242	9956	5300	9627	10555	18000
21	7076	9935	8374	9754	14414	9150
22	4913	10443	7016	9539	15301	7200
23	14300	10804	2712	12309	39699	17183
24	8526	10987	3289	10611	8838	8000
25	8871	15889	4982	13227	11005	13072
26	14292	15978	5811	11584	13364	10295
27	13700	14736	4982	1006	--	4803
28	7668	17629	9821	9156	16300	7527
29	8745	16576	1027	13433	17999	2320
30	8745	17892	3767	--	3099	9566
Oct 1	8888	12987	1125	1000	18936	11892
2	17360	15987	7676	10443	14995	6437
3	15340	18745	1012	8432	16932	11135
4	14035	19224	1421	1619	16932	10189
5	10449	15000	8924	4975	19362	14562
6	12100	18140	1289	10000	36939	3823
7	15599	18463	76821	10211	20935	9352
8	18433	16874	89214	72731	13629	11975
9	17905	15769	48121	9873	69999	7506
10	15310	17986	5468	8324	93639	9583
11	13470	16999	2912	6939	10526	6480
12	11400	18678	3984	18321	11959	14451
13	11430	19679	8987	1466	1191	8571
14	15876	16779	9910	13013	93695	9138
15	18660	17678	14514	13602	13699	9310
16	17474	15769	1456	10590	11569	9692
17	17251	16793	48964	4450	6399	25505
18	14695	16778	7892	1045	16993	11882
19	--	19865	43125	1007	--	14252
20	22911	17982	7982	10115	--	10026
21	9907	16639	993	--	--	11105
22	14370	17212	444	7000	--	14726
23	17944	19346	8212	9000	--	10009
24	11751	18434	4921	7534	--	11559
25	12767	17866	4414	6295	--	8531
26	14060	16979	5556	8210	--	11150
27	9306	17788	6789	10422	--	21891
28	19470	18689	6214	8996	--	1251
29	16006	19998	3421	9984	--	10305
30	15307	19189	9876	10000	--	10610
31	9404	17656	2321	1287	--	16890
Nov 1	16810	19989	8921	26064	--	10228
2	17270	16787	4879	9003	--	10558
3	8721	17235	422	7265	--	6198
4	9928	18624	889	3201	--	9152
5	13445	19723	234	1232	--	15489
6	5324	19811	18993	10872	--	4755
7	16742	18912	1234	11927	--	13028

Table II shows the total steps taken over 50 days for individual students.

TABLE II
GLOBAL CHILDREN'S CHALLENGE PROGRAM [PPS] TOTAL STEP COUNT FOR 6 STUDENTS OVER 50 DAYS

Student	1	2	3	4	5	6
Total steps taken over fifty days	657029	837887	546022	475694	648125	533622

Table III displays the number of days for which readings

were kept for the 6 students.

TABLE III
GLOBAL CHILDREN'S CHALLENGE PROGRAM [PPS] NUMBER OF DAYS WITH DATA

Student	1	2	3	4	5	6
No of days with valid readings	49	50	50	48	29	50

Table IV displays the average number of steps over 50 days for each of the 6 students.

TABLE IV
GLOBAL CHILDREN'S CHALLENGE PROGRAM [PPS] AVERAGE STEPS OVER 50 DAYS FOR THE 6 STUDENTS WITH DATA

Student	1	2	3	4	5	6
Average steps over fifty days	13409	16758	10920	9910	22349	10672

Table V shows the average number of steps over 50 days for the class which is an average of the 6 student's total steps.

TABLE V
AVERAGE STEP COUNT FOR THE CLASS OVER 50 DAYS [N=6] [PPS]

Grand total steps taken by six students	Number of students	Average / student
84019	6	14003

B. Equations

The formulae for calculating the average is given below. For each student, the total steps are added up for the 50 days so each student has a total. Student 1 total = steps for day 1+ steps for day 2 continuing to + steps for day 50. In addition, the number of days for which there is valid data is given for each student. The average steps / day for each student hence is the total steps for all the days where recordings were reported divided by the number of days for which data was recorded. In order to calculate a class average the average for each of the 6 students was added to given a grand total, then this total was divided by the number of students, which in this case was 6, to give a class average.

An alternative methodology that could have been utilized would be to use mean substitution for any missing daily recordings. This involves putting the average for that student in question into cells for those days where there is missing data. In fact, when this was done the same average daily class total was calculated.

III. DISCUSSION

The result of 14,003 steps is a pleasing result given the aim of the program was to encourage children to walk 15,000 steps / day. The basic results which have been reported above were also presented to the school community at a weekly assembly in 2013.

Worldwide, the total steps taken from all of the participants and classes whom entered the GCC was: 2,218,376,226. If you consider just one comparison with an overseas school, the W. Erskine Johnston Public School in Ontario, Canada where the results of this school were that the class step count on average was 14,670, this result in fact is not dissimilar to that of the Australian school detailed in this document. Both are near to

the recommended goal of 15,000 steps/ day.

Previous results detailed on the website include those from past years including 2011. In that year the GCC was host to 120,000 children from 27 different countries around the globe. Key statistics that year were that the average step count was 16, 277 steps / child and that approximately 3/4s of teachers noticed an increase in their student's overall health and well-being and likewise approximately the same percentage of teachers noticed a lasting impact upon the student's attitude towards physical activity.

Caution needs to be exercised in the interpretation of the results analyzed and reported in this manuscript due to the poor number of record books returned. There was not a good representation from the class for a number of reasons including the fact holidays were during the 50 day period, and also the school did not receive a lot of notice before the date of commencement that they were to participate, hence students were only quickly shown the units and booklets and hence the explanation may not have been adequate nor comprehensive enough for this age group. Both of these factors could have contributed to or could be an explanation for the poor return rate. There is also the difficulty that public health researchers face when trying to make schools aware of physical activity programs in that the primary focus of schools is educational programs so at times people whom have information on other opportunities or free units such as these which can be applied for may have to take a back seat so to speak as often work that has an educational focus has a higher priority.

Time is often limited when it comes to professionals working with teachers, and / or with groups / classes so at times this can be a downfall and this will vary depending upon the school, the individual class teacher and / or other factors. Times pressures are understandable to an extent however when programs are designed such that they are easy and convenient in terms of being slotted into the school routine, such as this one is, there should be minimal or little difficulty. This program was carefully designed to be incorporated easily into the school schedule and it must be remembered that improved physical health has flow on effects such as enhanced performance with school work. However, some physical activity events or agendas maybe better done as outside of school activities, either as after school care courses or implemented as such by sporting clubs and facilities.

Lastly, comparing data with other schools was available on the website at the time as many schools across the globe were participating. The website for this program closed towards the end of 2012, or early in 2013. Hence when the classes resumed in 2013 we were unable to view the website to look at any country specifics as the URL was obsolete.

The global children's challenge program was operational for 3 years with 2012 being the final year. There are similar programs related to this program, namely the global corporate challenge program however this program will not be discussed in detail in this manuscript but should readers be interested they can search and view details online as that website is still functioning.

There is a variety of online and digital step counters

available that incorporate modern technology with enhanced functionality, ease of set up and use, increased ability to alter settings, set upper limits, monitor performance, track progress and alert users once goals are attained or stepping stones reached. These applications and gadgets include for example; my weight loss coach, pacer for the iphone, running keeper, distance meter pro, go walk pedometer, iwalk, treadmill and fitbit. There are others available also that incorporate and work in conjunction with computers, phones and ipods. Technologically savvy young folk are more aware of all the gadgets and applications available when compared to people even in their 30s, 40s or 50s, whom may have been old school trained and educated. The unfortunate negative consequence of too much technology in our society is that it can foster and contribute to sedentary behavior. While this study reports on pedometers for walking, to give readers of this manuscript something to think about, quotes below related to running are worth pondering and deliberating upon.

An online Kera News article published in 2012, quotes Mr Peter McHugh, from Run-Fast, a British sports management company with a training camp in Iten, Kenya. Admittedly old-school, McHugh admires the elegant simplicity of how Kenyan runners train. "My argument is, for instance, that if you want to build strength in your legs, you should do what the Kenyans do, which is to run up hills," he says. "We are distracted enormously by heart rate monitors, by distance monitors, by very sophisticated gymnasiums, by taking blood tests, by measuring all sorts of things."

Mr Steve Moneghetti AM whom has won the City2Surf 4 years running [1988 to 1991], the Berlin Marathon, the Commonwealth Games Marathon, the Tokyo Marathon plus other events, in a Sydney Morning Herald online news report in 2014 when talking about the city to surf said; "runners should focus on the contest not their watches. He said the record has become a bit of a focus, but it is more important to just race it".

The 'Just Do It' trademark was launched in 1988 by shoe company Nike and was highly successful with the Age selecting the campaign as one of the top two taglines of the 20th century. One of the objectives was to target all Americans regardless of age, gender or physical fitness level.

In summary when considering a walking or running program regardless of whether you are a school student, middle aged or elderly, pregnant, disabled or an executive, think of the Nike slogan and what other experts have said, consult your Doctor or Physiotherapist then commence if given the go ahead. Walking or running is good for the mind and body, and can be done with or without physical activity trackers. Modern technology allows sophisticated monitoring, but everything in moderation with due respect for the fact it is not just a matter of speed, distance or kilojoules but exercise should be fun and enjoyable.

IV. CONCLUSION

This basic analysis is interesting. While the results in terms of the average number of steps taken by the class is pleasing the results need to be viewed and interpreted with caution in

light of the limitations that have already been explained. The program is easy to implement and these units are low cost, safe, fun and effective for increasing a young person's knowledge of and interest in physical activity which in this case is walking.

ACKNOWLEDGMENTS

The author would like to acknowledge the assistance of the local school Parkhill Primary School and in particular the class teacher Ms Jackie Knight and the physical education teacher Mr Dean Sciacca for assistance with the implementation of this program. The author would also like to acknowledge Mr Stephen Hilton for technical and computer support and for financial assistance. In particular, his financial contribution to the cost of travelling to the population health congress in Hobart where these results were presented, where the school was not in a position to assist financially.

REFERENCES

- [1] T. Dwyer, D. Hosmer, T. Hosmer, A.J. Venn, C.L. Blizzard, R.H. Granger *et al.* "The inverse relationship between number of steps per day and obesity in a population-based sample: The AusDiab Study," *Int J Obes (Lond)*, vol. 31, pp. 797-804, 2007.
- [2] A.J. Cameron, T.A. Welborn, P.Z. Zimmet, D.W. Dunstan, N. Owen, J. Salmon *et al.* "Overweight and obesity in Australia: the 1999-2000 Australian Diabetes, Obesity and Lifestyle Study (AusDiab)," *Med J Aust*, vol. 178, pp. 427-32, 2003.
- [3] S. T. Lee, J. E. Wong, S. N. Shanita, M.N. Ismail, P. Deurenberg, B. K. Poh. Daily physical activity and screen time, but not other sedentary activities, are associated with measures of obesity during childhood," *Int. J. Environ. Res. Public Health*, vol. 12, pp. 146-61, 2014.
- [4] R. Kelishadi, F. Azizi-Soleiman. "Controlling childhood obesity: A systematic review on strategies and challenges," *J Res Med Sci*, vol. 19, pp. 993-1008, 2014.
- [5] M. Dobbins, H.Husson, K.DeCorby, R. L LaRocca. "School-based physical activity programs for promoting physical activity and fitness in children and adolescents aged 6 to 18," *Cochrane Database of Systematic Reviews* 2013, Issue 2. Art. No.: CD007651. DOI: 10.1002/14651858.CD007651.pub2.
- [6] D.E. Bock, T. Robinson, J.A. Seabrook, M. Rombeek, K. Norozi, G. Filler *et al.* "The Health Initiative Program for Kids (HIP Kids): effects of a 1-year multidisciplinary lifestyle intervention on adiposity and quality of life in obese children and adolescents – a longitudinal pilot intervention study," *BMC Pediatr*, vol. 14, pp. 296, 2014.
- [7] H. Oude Luttikhuis, L. Baur, H. Jansen, V. A. Shrewsbury, C. O'Malley, R. P. Stolk, *et al* Interventions for treating obesity in children. *Cochrane Database of Systematic Reviews* 2009, Issue 1. Art. No.: CD001872. DOI: 10.1002/14651858.CD001872.pub2.
- [8] E. Waters, A. de Silva-Sanigorski, B. J. Hall, T. Brown, K. J. Campbell, Y. Gao, *et al.* Interventions for preventing obesity in children. *Cochrane Database of Systematic Reviews* 2011, Issue 12. Art. No.: CD001871. DOI: 10.1002/14651858.CD001871.pub3.